# SYSTEM NARRATIVE FOR FIRE ALARM AND COMMUNICATION SYSTEMS FOR: THE WORLD TRADE CENTER

The proposed system outlined for the World Trade Center encompasses the following facilities:

One World Trade Center.
Two World Trade Center.
North-East Plaza Building.
South-East Plaza Building.
Concourse Level.
Sub-Grade Level.

The ultimate system will integrate detectors and alarm devices from the various buildings, to be tied into a control panel for that building or level. All control panels will simultaneously annunciate alarms and troubles at the Operations Control Center.

## EXISTING SYSTEM

The existing system consists of American Multiplex Remote Monitoring Transponders (RMT), on approximately every third floor, connected to the Digital Computer and Console in the Operations Control Center on the B-1 Sub-Grade Level. The Transponders currently monitor pyrotronics CR-7 Equipment connected to type DI-2, DI-3, DI-4A and DI-6 smoke detectors (non-addressable type), pyrotronics system 3 panels, tenant proprietary systems, waterflow switches, tamper switches, control contacts etc., located on each floor.

Pyrotronics XL3 smoke detector systems, with addressable type heads, are installed in the mechanical equipment rooms of both Tower One and Tower Two, and connected via a CXL Communication Device to a console in the Operations Control Center.

Pull Stations are wired to an existing Executone system which alarms directly to the Fire Department.

The Public Address Communication System with manually activated selection of floor and warble tone fire alarm signal is also located at the Operations Control Center. Alarms from these systems are called in to the Fire Department, manually, by the P.A. Police on duty 24 hours a day at the Police Desk.

## INTERIM SYSTEM - PHASE I

We are presently installing control equipment and Remote Transponders Panels that will be part of a new Pyrotronics MXLV Fire Alarm System, which will ultimately be able to support the input devices, as well as dual channel audio alarm communications, strobe signals, addressable smoke detectors and warden communications and manual pull stations for the floors of all buildings.

New strobes, speakers, addressable smoke detectors and warden's stations will be installed under the next phase of the work. The Transponders will be located on approximately every third floor and will be connected o the existing CXL Communication Device presently serving the XL3 smoke detector system for the mechanical equipment rooms.

We plan to operate both the existing American Multiplex system and the new Pyrotronics System concurrently as we transfer all monitoring functions from the existing system to the new system on a point-by-point basis.

During this phase, no peripheral or outlying equipment is being installed. Once the transfer is complete, the new system will monitor existing contact changes in state, and mimic the point-to-point indications of the existing systems RMTs. The points that will be monitored are as follows:

1. Elevator Lobby smoke detectors via existing CR-7 cards.
2. Waterflow switches.
3. Tamper switches.
4. Subsystems - Proprietary System.
5. Duct detectors via existing CR-7 cards.
6. Pyrotronics XL-3 System for MER Smoke Detectors.

At this point, the American Multiplexing System will no longer be a part of the Fire Alarm System and all functions will be carried out by the Pyrotronics Systems.

SYSTEM UPGRADE PHASE II

The System installed in Phase I is an MXLV addressable Integrated Voice Communication System. This is multiplexed addressable hardware, which provides for distributed monitoring as well as audio communication. The MXLVR are the Transponders to be located throughout the facility and contain the necessary cards to support the point totals currently being serviced by the American Multiplex System, as well as those required to drive speaker, strobes and monitor addressable smoke detector heads. In Phase II, we will install all new speakers, strobes and addressable smoke detector heads.

Once the speakers are installed, the existing communication system will be taken out of service. As the new addressable heads are installed, the existing CR-7 equipment and non-addressable heads will be removed. By installing strobes and other peripheral equipment, such as the warden phones etc., we intend to have a fully code compliant system.

DESIGN INTENT

It is the intent of this design to isolate areas of alarm based upon the specific buildings and areas. For example, the Tower buildings will be serviced by their own system and will not be contingent upon the operation of the Concourse and sub-grade buildings. In light of the size of these buildings, it is believed to be prudent to isolate them in this way, so as to preclude alarm transmissions in the towers to not ring alarms in other areas of the complex. The system will, however, have the capability, from a single

location to patch signals between the buildings to make announcements throughout the other buildings, or specific areas in each building. For example:

A. Elevator lobby Smoke Detector Alarm on th 53rd floor of Tower I, will:

1. Engage circuits to provide connection of strobes on that floor and the floor above.
2. Engage circuits to provide connection of speakers on that floor and the floor above.
3. Recall the elevators for Tower I - for this bank only.
4. Annunciate alphanumeric display of alarm point on the lobby control panel.
5. Annunciate alphanumeric display at the Operations Control Center.
6. Engage circuits to provide connection of speakers with an alert tone.

The MXLV Fire Command Stations will be located as follows:

| Area Served | Panel Location | Type of Panel |
|---|---|---|
| 1 WTC - | Lobby of 1 WTC - | Main MXLV |
| 2 WTC - | Lobby of 2 WTC - | Main MXLV |
| N. East Plaza Bldg. & Area Below | Lobby of N. East Plaza Bldg. | Main MXLV |
| S. East Plaza Bldg. & Area Below | Lobby of S. East Plaza Bldg. | Main MXLV |
| Concourse | Lobby of 2 WTC | Main MXlV |
| Sub-Grade Areas J&K | Lobby of 2 WTC | Main MXLV |
| | | |
| 1 WTC | Redundant Operation Ctrl. Ctr. | Redundant MXLV |
| 2 WTC | Redundant Operation Ctrl. Ctr. | Redundant MXLv |
| | | |
| S. East Plaza Bldg. | Lobby of N. East Plaza Bldg. | Remote MXLV |
| N. East Plaza Bldg. | Lobby of S. East Plaza Bldg. | Remote MXLV |
| Concourse | Lobby of 1 WTC | Remote MXLV |
| Sub-Grade Areas J&K | Lobby of 1 WTC | Remote MXLV |
| | | |
| 1 WTC | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| 2 WTC | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| Sub-Grade Areas J&K | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| Concourse | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| N. East Plaza Bldg. | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| S. East Plaza Bldg. | Permanent Operation Ctrl. Ctr. | Remote MXLV |
| | | |
| Sub-Grade Areas J&K | Redundant Operation Ctrl. Ctr. | Remote MXLV |
| Concourse | Redundant Operation Ctrl. Ctr. | Remote MXLV |
| N. East Plaza Bldg. | Redundant Operation Ctrl. Ctr. | Remote MXLV |
| S. East Plaza Bldg. | Redundant Operation Ctrl. Ctr. | Remote MXLV |

The Fire Command Stations will have the capability to:

1. Make public address announcements through speakers from the fire command station selectively or on an all call basis.
2. Communicate with warden stations on a floor by floor basis.

3. Acknovledge and reset alarms within Area Served.

It will not be capable of Communication to other areas.

For this reason redundant MXLV's are provided in the Operations Control Center for 1 WTC and 2 WTC and remote panels for sub-grade and concourse in the Lobby of 1 WTC.

From the Operations Control Center via the CXL and Warden phones, it will be possible to:

1. Page to all facilities, on an all call basis.
2. Acknowledge and reset alarms throughout all facilities.

The overall intent of Phase II is to comply with New York City, Local Law 5, 16 and 58 and ADA Code. However, as indicated Phase I will comprise the backbone and will monitor the points as they exist today.

The existing equipment as well as the equipment being installed falls under the B.S.A./M.E.A. numbers indicated on the attached sheets.

*PORT AUTHORITY OF NY & NJ*
*WORLD TRADE CENTER*
*NEW YORK, NY*

*PROJECT: MXLV FIRE PROTECTION SYSTEM*

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*SUPPLEMENT TO NARRATIVE*
*REMOTE COMMAND STATIONS*

*The MXLV system supports up to (4) command stations, (1) master command and (3) remote command stations. Any one of the command stations can control the system independently.*

*Each Remote Command Station (RCS) is an exact duplicate of the command functions of the Master command station. The Remote command station utilizes the processing and control electronics contained in the Master MXLV on a switched basis.*

*On each command station are (3) VSM-1 switches which control the location of system command. The switches are:*

*1-REQUEST ACCESS*

*2-GRANT ACCESS*

*3-DENY ACCESS*

*The sequence of operation is as follows:*

*1.0 Normally, and by default, command remains at the Master MXLV which is usually located in the lobby of the protected facility., as approved by the Fire Department.*

*2.0 If any command station desires control the **REQUEST ACCESS** button is depressed. This alerts the current command location that control is being requested at another location.*

*The other operator can allow control to be transferred by depressing the **GRANT ACCESS** button at which time system control is automatically switched to the requestor.*

***OR***

*The other operator can deny the request and retain control by depressing the **DENY ACCESS** button.*

*2.1 In the event that a request is made and no operator is available, or responds, at the other command station an automatic timer will timeout and transfer control if no **DENY ACCESS** is received.*

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# *MXLV SYSTEM TECHNICAL SPECIFICATIONS*

*1.00. System Function*

*A. The system shall be a complete, electrically supervised multiplex style fire detection and voice evacuation system with intelligent analog alarm initiation, to be device addressable and annunciated as described and shown on the drawings.*

*01. The maximum number of devices on a single signalling circuit shall not exceed sixty with a capacity of sixty reporting system inputs and sixty system control outputs.*

*a. Devices attached to the signalling circuit shall be individually identifiable at the control panel for alarm and trouble indication. Smoke detectors shall be interrogated for sensitivity settings from the control panel, logged for sensitivity changes indicating the requirement for cleaning, and tested by a single technician using the panel field test routine.*

*b. Sensitivity settings of individual detectors shall be automatically or manually adjustable from the control panel to reduce the incidence of false alarms caused by environmental conditions.*

*c. The analog signalling circuits shall be installed in the fire alarm control panel enclosure or in remote circuit interface panel enclosures.*

*d. Analog signalling line circuits (ALD) shall be Style "4".*

*02. The system shall support intelligent analog smoke detection, conventional smoke detection, manual station, water flow, supervisory and status monitoring devices. The system shall also support amplifiers, voice/visual circuits, and firefighter's telephone system.*

*03. The panel shall be UL listed as a test instrument for the measurement of the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors to comply with the testing requirements of NFPA 72E.*

*a. The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts when in the sensitivity voltage list mode.*

*b. The control panel shall provide a display and a printed list of these sensitivity measurements as a permanent record of the required sensitivity testing.*

*c. When programmed, any system connected ionization or light refraction style smoke detector shall be capable of self adjustment to compensate for the accumulation of contaminates that would change the detector sensitivity in either a more or less sensitive direction. This adjustment shall keep the relationship between the sensing chamber voltage and the programmed alarm threshold voltage constant to prevent false indications or failure to alarm in the presence of smoke.*

*04. The system shall annunciate a trouble condition when any smoke detector approaches 80% of its alarm threshold due to gradual contamination, signalling the need for service and eliminating unwanted alarms.*

a. *The trouble report shall annunciate the specific location of the smoke detector requiring service. All analog smoke detectors installed in the system shall include this feature.*

05. *Any intelligent analog smoke detector or conventional smoke detector zone shall include a selectable alarm verification capability. This feature shall provide automatic verification of smoke detector alarms as described by NFPA 72E.*

06. *All external circuits shall be listed as power limited circuits per article 760 of the National Electric Code.*

a. *Power limitation shall be provided using on board self restoring solid state thermal devices. Units using fuses for this purpose and requiring board replacement or exchange are not considered equal.*

07. *The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.*

a. *Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits.*

b. *The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition.*

c. *Detector operation in the failsafe mode shall continue at the alarm threshold previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.*

08. *The system shall provide a default operation program to allow reporting of alarms from installed devices before loading of custom system software.*

09. *The system shall report alarms from devices installed but not yet added to the system custom program. Alarm reports from these devices shall activate indicating appliance circuits.*

10. *The system shall perform time based control functions including automatic changes of specified smoke detector sensitivity settings.*

a. *Time based functions shall be controlled by specifying time periods or actual dates. It also shall provide the ability to control these functions on an exception basis using a holiday schedule.*

11. *The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test.*

a. *Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types.*

b. *All field test activity shall be logged to the system printer and historical memory.*

12. *The system shall be provided with eight levels of password protection with up to forty passwords.*

13. *The system shall be programmed in the field via a laptop computer. All programmed information shall be stored in nonvolatile memory after downloading into the control panel. No special programming terminal or prom burning shall be required and the system shall continue in service during reprogramming. Systems requiring on line programming or not capable of mass uploading of software for offsite documentation or editing will not be considered acceptable.*

a. *During program upload or download the system shall retain the capability for alarm reporting.*

b. *The system shall download to a PC for program editing. System program shall be stored on a floppy disk and all programming shall be multi-level password protected.*

14. *The system shall consist of a central architecture using a single centrally located control unit. The system also shall be operable in a distributed multiplex architecture using a centrally located control unit with interconnection to remote circuit interface panels containing any combination of plug in intelligent analog signalling circuits, plug in conventional initiating device circuits and plug in relays.*

a. *The remote circuit interface panels shall provide a power supply, microprocessor controlled battery charger and communication link to the main CPU through a high speed 19.2K baud RS-485 network.*

15. *The system shall support the use of multiple CRT's for the display of information in a format equal to that of the system logging printer.*

16. *The system shall support the use of a UL listed interactive video display terminal displaying system information in a format equal to the CRT and logging printer.*

a. *The VDT shall retain in local memory, four pages of system activity, allowing scrolling of the data.*

b. *The VDT shall provide the ability to execute system commands such as Acknowledge, Silence and Reset. It shall list alarm, trouble and supervisory conditions with system diagnostic reports. The VDT shall be fully supervised by the CPU.*

17. *The system shall also support the use of a color interactive History Reporting video display terminal displaying information in a format equal to the CRT and logging printer.*

*Event types shall be displayed in different colors, i.e., Alarm - RED, Troubles - YELLOW, Supervisories - MAGENTA, Acknowledged Events - GREEN.*

a. *The History Reporting terminal shall be capable of logging events to a hard disk drive for future retrieval. The number of events shall be limited only by.the hard disk drive capacity.*

b. *The History Reporting terminal shall provide the ability to execute system commands such as Acknowledge, Silence, Reset. It shall list all alarm, trouble, supervisory conditions, along with system diagnostic reports. The History Reporting terminal shall be fully supervised by the CPU.*

c. *As an option, a supervised parallel printer may be connected to the History Reporting terminal. This printer will print all system activity as well as History Log reports as required.*

18. *The system shall support a UL listed supervised printer.*

a. *Multiple unsupervised ancillary printers also shall be supported as approved or required by the authority having jurisdiction.*

19. *The system as installed shall be expandable to its predetermined maximum capacity of 3,000 initiation devices and/or 2,000 combined zones of speakers, visual devices and firefighter's telephone.*

1.01. *System Zoning*

A. *Each intelligent addressable device or conventional zone on the system shall be displayed at the fire alarm control panel by a unique alpha numeric label identifying its location.*

1.02. *System Operation*

A. *Activation of any fire alarm initiating device shall cause the following actions and indications:*

01. *Display a custom message describing the device originating the alarm condition at the Fire Command Center, and at the local fire alarm control panel LCD alpha numeric display. Remote LCD annunciators shall display the alarm condition via unique messages as required by the system owner. LED type annunciator displays, conventional and graphic style shall indicate alarm zoning as specified.*

02. *Sound the speaker circuits, and activate the visual signals on the floor of and the floor above the alarm.*

a. *Audible/Visual signals shall be silencable from the fire alarm control panel by an alarm silence switch. The alarm indication shall be transferred to a visual indicator on the control panel and the alarm signals shall resound for a subsequent alarm condition, reported by a different device.*

b. *A signal dedicated to sprinkler system water flow alarm shall not be silencable while the sprinkler system is flowing at a rate of flow equal to a single head.*

03. *Shut down all air handling units within the smoke zone of alarm origin.*

04. *Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user.*

05. *Close all smoke doors and smoke dampers shown on the drawings to prevent the spread of smoke.*

06. *Provide output functions for smoke control systems.*

07. *Record within the non-volatile system historical memory (chronoLINK)the occurrence of the event, the time and date of occurrence and the device initiating the event.*

B. *Activation of any smoke detector in a single elevator lobby or an elevator equipment room shall, besides the actions described above, cause the recall of that bank of elevators to the terminal floor and the lockout of controls. In the event of recall initiation by a detector in the first floor lobby, the recall shall be to the alternate floor.*

C. *Activation of any detector in an elevator hoistway or machine room shall cause the capture of that bank of elevators per FDNY requirements.*

D. *Initiation of an alarm from a smoke detector installed in the supply air stream of any stairwell pressurization fan or air handling unit not operating as part of an engineered smoke removal system shall cause the shutdown of that fan.*

E. *Activation of any supervisory circuit, (supervised valve closure, air pressure abnormal, low temperature, fire pump trouble) shall cause the following actions and indications:*

01. *Display the origin of the supervisory condition report at the Fire Command Center, and at the local fire alarm control panel alphanumeric LCD display.*

02. *Activate supervisory audible and visual signals as indicated within this specification.*

a. *Audible signals shall be silencable from the fire alarm control panel by an alarm acknowledge switch. The supervisory indication shall be transferred to a visual indicator on the control panel and the supervisory signals shall resound for a subsequent supervisory condition, reported by a different device.*

03. *Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user.*

04. *Record within chronoLINK the occurrence of the event, the time of occurrence and the device initiating the event.*

G. *Receipt of a trouble report (primary power loss, open or grounded initiating or signalling circuit wiring, open, grounded or shorted indication system wiring, device communication failure, battery disconnect) at the fire alarm control panel shall cause the following actions and indications:*

01. *Display at the Fire Command Center, and at the local fire alarm control panel alphanumeric LCD display, the origin of the trouble condition report.*

02. *Activate trouble audible and visual signals at the control panel and as indicated on the drawings.*

a. *Audible signals shall be silencable from the fire alarm control panel by a trouble acknowledge switch. The trouble indication shall be transferred to a visual indicator on the control panel and the trouble signals shall resound for a subsequent trouble condition reported by a different device.*

03. *Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user.*

a. *Offsite trouble reports for primary system power failure shall be automatically delayed for a period of time equal to 25% of the system standby battery capacity to eliminate spurious reports as a result of power fluctuations.*

04. *Record within chronoLINK the occurrence of the event, the time of occurrence and the device initiating the event.*

## *PART 2 SYSTEM PRODUCTS*

### *2.01. Fire Alarm Control Panel*

A. *Fire alarm control panel shall be designed for mounting as indicated on the drawings.*

B. *The control panel shall be Cerberus Pyrotronics model MXLV, modular in construction and shall include, but not limited to; the hardware, software and firmware required to perform the following major system functions:*

01. *Surface mounted steel cabinet with indicator viewing window, hinged door and cylinder lock, dead front construction, and factory finished in baked red enamel.*

02. *System power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. The system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power. Battery standby shall be rated for 4 hour operation. All system equipment shall be connected to the buildings emergency power circuits which shall transfer automatically upon normal power failure.*

03. *System 16 bit core processor, with internal operating system processing incoming alarm signals and issuing output commands required as a result of the alarm reception by system programming or manual commands. Total system response time shall not exceed 2.5 seconds on a system configured to the maximum capacity. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity. Systems with a single watchdog circuits for all processors shall no be acceptable.*

04. *NFPA Style"7" system digital communication capabilities required for the control panel to communicate with remote transponders (MXLRV) and remote command stations (RCS). All communications shall be conducted in a digital format. Systems processing signals using pulse width or voltage level techniques are not considered acceptable. Provide Cerberus Pyrotronics model NET-7 for "Style 7".*

05. *Style"4" analog signalling circuit required to communicate with, and receive alarms from 120 points, consisting of a maximum of sixty intelligent analog alarm initiating and sixty intelligent controllable output devices. Provide Cerberus Pyrotronics model ALD-21 analog loop driver.*

06. *Detection line circuit monitoring shall be provided by a Conventional Zone Module, Model CZM-4. This module shall be system interconnected by a card edge connector and shall be operated by the MXL control panel. Each circuit shall be capable of Style "D" or Style "B" wiring. Style "B" wiring shall require an end of line device. Each zone shall accommodate up to thirty (30) Pyrotronics ionization or photoelectric detectors, flame and beam detectors, as well as any quantity of shorting type contact devices.*

07. *An output circuit for operation of DC (coded if required) audible devices, leased line or city tie, shall be provided by Controllable Signal Module, Model CSM-4. This module shall be system interconnected by a card edge connector, capable of operating with either Style "Y" or Style Z" wiring, and shall be operable by the MXL control panel. All Style "Y" indicating circuits shall require and be fitted with an end-of-line device. The output current shall be at 1.5 amps maximum per circuit, and each circuit shall be fused separately. The module shall be supervised by the MXL control unit for open and shorted circuits. Open and short circuits shall report trouble only and respond with circuit identification. The module shall contain two (2) programmable open collector outputs capable of sourcing 250 ma at 40 VDC for relay or LED activation.*

08. *For control of air handling units and elevators there shall be provided a Controllable Relay Module, Model CRM-4. The module shall be system interconnected by a card edge connector and shall be operable by the MXL control unit. It shall contain four independent relays, fitted with form "C" contacts, rated at 2 amps 28VDC/120 VAC resistive. All relays shall be supervised for coil open or shorted conditions.*

09. *Provide CMI-300 Communications module for communication to the Fire Command Center.*

10. *Mother boards shall be used to plug in the following modules for system expansion; ALD-21 Analog Loop Driver, CRM-4 Relay Module, CZM-4 Conventional Zone Module, CSM-4 Indicating Module, CMI-300 CXL/MXL interface module. Mother Board shall be Cerberus Pyrotronics model MOM-4.*

11. *The integrated voice system shall be capable of two (2) voice channel operation simultaneously (Evacuation and Alert. Systems using a dedicated paging channel shall not be considered equal.*

12. *System shall have the ability of up to three (3) remote command stations (RCS). Reference Cerberus/Pyrotronics drawing WTC-ICS-1.*

13. *The integrated voice system shall be designed for distributed amplification.*

14. *The voice system amplifiers shall be capable of operating 70vrms speakers. The amplifiers shall provide 100 watts of power. It shall transfer to battery when commercial power has failed or disconnected. The amplifier shall have LED's indicating "AC power fail" and "Battery trouble". The amplifier shall be Cerberus Pyrotronics model EL-410C.*

15. *The Audio Control Module model ACM-1 is the master control module for all related voice related functions through the RS 485 communications lines. This module shall have a supervised tone generator capable of providing a variety of tones for use in the system. AccuLINK configuration determines which tone the system uses. The programmed tone shall be:*

*1) EVAC- Slow Whoop.*
*2) ALERT- 900 Hz.*

*A backup tone card model BTC-1 card shall be connected to the ACM-1 card. The ACM-1 shall also include a microphone preamplifier for use with the MMM-1 Microphone master module. The pre-amplifier shall use an automatic gain control circuit to assure distortion free live voice announcements. A back-up pre-amplifier shall be provided with automatic transfer if primary pre-amplifier fails.*

16. *The Master Microphone Module model MMM-1 shall provide firefighters with the means of sending voice messages to specific audio zones or all zones. The microphone and the press-to-talk switch shall be supervised. This module contains a local speaker with volume control to monitor selected audio channels.*

17. *The Audio Supervision Module model ASC-1 supervises the output of three (3) primary amplifiers and one backup amplifier. This module compares amplifier output to amplifier input available on the OMM-1 board. If one of the primary amplifiers fails, the ASC-1 switches the appropriate input signal to the backup amplifier and the backup amplifier output to the audio channel formerly served by the failed amplifier. Through the use of the ASC-1, back-up amplification shall be provided for either a one for one or a one for multiple basis. Back-up amplifiers shall be able to support primary amplifiers in any of the two (2) Channels.*

18. *The Audio Supervision Module model ASC-2 supervises the output of one primary amplifier and one backup amplifier. This module compares amplifier output to amplifier input available on the OMM-1 board. A trouble signal is produced if they do not match. If one of the primary amplifiers fails, the ASC-2 switches the appropriate input signal to the backup amplifier and the backup amplifier output to the audio channel formerly served by the failed*

*amplifier. This module shall provide the means for sharing one backup amplifier. The ASC-2 shall be used to supervise high power audio risers when using central amplification with remote switching.*

19. *The Output Control Module model OCC-1 controls the voice system modules plugged into the OMM-1 module. Commands received from the MXL system through the RS485 network are processed by this module. This module sends signals to the other modules in the system through the OMM-1 bus to carry out the action requested by the MXL program. The OCC-1 supervises up to 11 modules under its control. Each module supervised by the OCC-1 respond with its status. This status information is then sent to the MXL as required.*

20. *The Output Master Module model OMM-1 is the cardcage for the following MXLV modules; OCC-1, ASC-1, ASC-2, and the Z series output modules. The OMM-1 shall provide screw terminals for field and inter-panel wiring. Terminals shall be capable of using up to 14 AWG wire.*

21. *A manual control and annunciator model VSM-1 shall be provided in quantities required by the system. The module shall have multiple colored LED's (Red, Green) flashing and steady for indicating status of switch activity. LED's shall have positive feed back for actions selected. AccuLINK programming software shall be used to map switches to functions and any number of zones as required to perform system operation outlined in the specifications and drawings. Systems using multiple switches to activate groups of zones or functions shall not be acceptable.*

22. *A system annunciator model VLM-1 shall be provided in quantities as required. The LED annunciator shall have multiple color LED (Red, Green & Yellow) capable of steady or flashing conditions as directed by accuLINK. LED's shall have positive feed back for actions selected. Annunciators not having at least three (3) colors and positive feed back shall not be acceptable.*

23. *A Terminal Block Module model TBM-1 shall be provided for interface between internal and field wiring. The module shall be capable of connecting audio risers "Style Z "(Class A), and telephone riser in "Style Y" Class B type wiring. This module shall have an RCA type jack for connection to an external audio sources such as back ground music. The module shall have an RCA type output jack for connection to an external audio recording unit. AccuLINK shall configure the operation of this output to become active when ever the microphone is pressed or, when configured to monitor telephone traffic, and is activated when ever a telephone station is on line. Systems which do not have an output jack to external recording devices shall not be acceptable.*

24. *Strobe Zone Card model ZC1-8B-25 shall provide 8 zones "Style Y" (Class B) for 24 VDC strobe lights. When using strobe lights the current shall not exceed 1.5 amps.*

25. *70.7 vrms amplification is selected provide as required a Speaker/Strobe Zone Card*

*model ZC2-8B-70. Each card shall provide 8 zones "Style Y" (Class B) for single or dual channel 70.7 vrms speakers, each circuit shall not exceed 25 watts.*

26. *Telephone Master Module model TMM-1 shall be supplied and located next to the system alphanumeric annunciator panel. The handset shall be constructed of high impact plastic, with a "Push To Talk" button and coil cord. It shall include firefighters telephone riser interface circuitry and shall support at least five (5) telephone stations on line simultaneously with no degradation of audio quality. The Firefighters Telephone System shall have a warden page function which shall allow live voice announcements from any remote telephone station. Remote telephone stations shall receive an acknowledge signal when calling in, and a distinct busy signal when the command console operator is on line with another telephone zone.*

27. *TMM-1 module is supplied provide Firefighter Telephone Zone module model ZCT-8B as required. Each zone is activated when a firefighters telephone station (FT-301/302 series) connected to that zone is taken off hook or a portable handset (PT-303/304 series) is plugged into a jack (FJ-303 series). Up to five (5) telephone stations and the master handset may be off hook simultaneously with no loss in audio quality.*

28. *The enclosure for the system shall provide complete dead front construction. Human interface modules shall be on a frame hinge mounted to provide easy access to wiring and system plug in cards. Enclosure door shall be pin hinged and removable, for easy system operation by firefighters, and technicians in testing, and maintenance modes.*

29. *System shall have remote microphone capability for paging accuLINK selected zones or all page from any remote firefighters telephone jack. System employing Warden Page only shall not be acceptable.*

30. *System shall have firefighters warden page.*

31. *The system shall include chronoLINK for system data base, historical event log, logic, and operating system. The system shall require no manual input to initialize in the event of a complete power down condition. It shall return to an on line state as an operating system performing all programmed functions upon power restoration. Systems requiring battery backed-up memory devices shall not be acceptable.*

32. *System display consisting of an 80 character back lighted alphanumeric super twist LCD display readable at any angle. Thirty two character customer defined custom messages shall describe the location of the active device.*

    a. *As an option for local protective signaling systems, the system shall be capable of programming to allow troubles occurring and restored in the system to be automatically removed from the display queue, eliminating the necessity for individual acknowledging of these events. This feature shall not affect the historical logging of events as programmed.*

    b. *As a minimum, an LED display for "ALARM", "AUDIBLES SILENCED", "SUPERVISORY", "TROUBLE", "POWER ON" and "PARTIAL SYSTEM DISABLED". (SECURITY SHALL NOT BE USED*

*IN NYC PER MEA LISTING).*

c. *Touch activated membrane switches for "ALARM ACKNOWLEDGE", "AUDIBLE SILENCE", "SUPERVISORY ACKNOWLEDGE", "TROUBLE ACKNOWLEDGE", "RESET", "DISPLAY HOLD" and "DISPLAY NEXT".*

d. *All membrane switches shall be tactile with audible feed-back when pressed.*

e. *Touch activated membrane switches, programmable to perform a minimum of twelve custom functions such as drill, disable, bypass automatic control commands or other special functions as required by the system user.*

f. *Ten digit keypad for the passcode entry to perform programming and maintenance functions.*

g. *The system shall have the ability to have additional MKB-2's as remote annunciators or remote control stations. Up to four (4) supervised MKB-2 annunciators may be in the system. Each supervised MKB-2 can have slave MKB-2's connected to them up to the system maximum. Each MKB-2 with a PIM-1 card can have devices such as; Printers, Video Display Terminals, Color Video Display Terminals, or CRT's.*

33. *Conventional zone modules as required in Style"B" or Style"D" for the operation and supervision of a minimum of 30 compatible two wire detectors per zone.*

34. *Programmable panel mounted relays to be software programmed to perform control functions required for system operation described in this specification.*

35. *Software defined logic module as required for each alarm initiation point, capable of controlling any combination of the system output functions using as logic factors; counting, verification, time, day, holiday, type of device, "and", "or", "not", "timer", "all", "any", flip-flop, D latch, and up to 32 levels of programming shall be possible.*

36. *Software logic modules and system database shall be programmed using a DOS compatible program on any IBM compatible computer. It shall be possible to program or edit the system database off site after downloading from the control panel.*

37. *Selective chronoLINK, up to 800 events, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports.*

a. *AccuLINK shall allow selection of events to be logged, including; inputs, as alarms, troubles, supervisories, status changes and device verification; outputs, as audible control and output activation; actions, as reset, set sensitivity, arm/disarm, override, password, set time and acknowledge.*

b. *Data format for downloading shall be compatible with the data base handling program, Paradox by Borland, allowing custom report generation to track alarms, troubles and maintenance.*

c. *Audible and visual indications shall be generated when memory is 80% and 90% full to allow downloading of data.*
*The system shall be programmable circular logging, assuring that at least the last 400 events will always be stored in non-volatile memory.*

38. *EnviroLINK software driven logic for adjusting the alarm threshold windows on detectors to compensate for accumulating contamination and keep detector response sensitivity constant. The software shall compensate for either over-sensitized or de-sensitized units, raising a system flag when a detector approaches the allowable limits of adjustment, indicating a requirement for cleaning.*

a. *EnviroLINK values shall be stored in non-volatile memory allowing activation of all tracking functions within 90 seconds of system initiation from a "cold boot". During the boot sequence, alarms from detectors programmed with the feature shall be suppressed. When the full data history is active all devices shall be checked and any active alarms displayed.*

b. *The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to it's pretest state.*

c. *The system shall be capable of monitoring the state of detectors and displaying a message when a detector is approaching the limits of adjustment as a result of contaminates. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminates.*

d. *The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.*

2.02. *Fire Alarm System Power Supplies*

A. *System primary power*

01. *Primary power for the FACP and the secondary power battery chargers shall each be obtained from the power panel board. Circuit breakers shall be fitted with a suitable guard, requiring removal of a screw to open, and used only for fire alarm. Each circuit used for fire alarm purposes shall be permanently labeled for function.*

02. *MXLV power supply and battery charging shall be provided by the MMB-1 main board and an MPS-6 power supply.*

03. *MXLR/MXLRV power supply and battery charger shall be provided by the PSR-1 remote power supply and an MPS-6 power supply.*

B. *Secondary power supply*

01. *Provide sealed gelled electrolyte batteries as the secondary power supply for the fire alarm control panel and each system circuit interface panel. The battery supply shall be calculated to operate its load in a supervisory mode for (4), with on site fully complying standby generator, hours with no primary power applied and, after that time, operate its alarm mode for five minutes. Batteries shall be sized at no larger than 80% of the calculated size to compensate for deterioration and aging during the battery life cycle. Battery calculations shall be submitted to justify the battery size. Batteries shall be housed in the control cabinet or a separate cabinet with adequate cell separation to prevent accidental discharge.*

02. *Provide battery charging circuitry for each standby battery bank in the system low voltage power supply or as a separate circuit. The charger shall be automatic in design, adjusting the charge rate to the condition of the batteries. Battery charge rate and terminal voltage shall be read using the fire alarm control panel LCD display in the service mode, indicating directly in volts and amps.*
*Meters reading in percentage are not acceptable. Charger shall be housed in the main fire alarm control panel or the battery cabinet.*

2.03. *Remote Circuit Interface Panels (MXLRV Transponders)*

A. *Remote circuit interface panels shall be Cerberus Pyrotronics type MXLR or MXLRV, and shall consist of an enclosure, a PSR-1 Remote Power Supply, NET-7 digital communications circuitry, mother boards either MOM-4 or OMM-1, batteries and hardware, modules and circuitry described for inclusion in the fire alarm control panel as required to function as specified.*

01. *Circuit interface panels shall, when required, include CZM-4 conventional zone module, ALD-21 analog loop drivers, CSM-4 indicating appliance circuits, CRM-4 output circuitry to perform actions, ZC1, ZC2 series speaker circuits, EL-410C amplifiers and ZCT-8B firefighter telephone circuits. All fire detection, alarm and indicating devices supported by the circuit interface panel shall function as a self standing system in the failsafe mode upon loss of the central fire alarm control panel processing, communications or the communications wiring between them.*

02. *Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the default mode.*

03. *Circuit interface panels shall support remote system displays, annunciators and printers.*

2.04. *Intelligent Device Programmer/Tester*

A. *Cerberus Pyrotronics sensorLINK UL listed programmer and tester, complete with the following features:*

01. *The programmer shall be portable with internal rechargeable battery and charging supply sufficient for four hours of use before requiring recharging.*

02. *The programmer shall set and verify the device address and perform a device test to assure operation within the UL defined detection window. This programming and testing shall be done independent of the control panel and system wiring.*

03. *The programmer shall be menu driven with an integral keypad and LCD display.*

04. *The programmer shall contain an integral detector base and non-polar leads to program and test intelligent modules with screw terminals.*

05. *The tester/programmer shall be housed in a carrying case with cover, latch and handle, type FPI-CC.*

06. *The tester shall be equipped with battery conservation circuitry to shut off power to the device should no keyboard activity take place for five minutes.*

07. *The programmer tester shall dynamically display in real time, the detector chamber analog voltage.*

2.07. *Smoke Detectors, Intelligent Ionization*

A. *Furnish and install where indicated, Cerberus Pyrotronics type ID-60I, intelligent analog smoke detectors with features and characteristics as follows:*

01. *The detector shall be dual chamber and self compensating for ambient temperature and humidity.*

02. *The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discreet electrical value for status tracking and logging for determining maintenance and cleaning requirements.*

a. *The control panel shall provide a sensitivity readout from the detector without removal from the pluggable base.*

b. *Detectors not specifically listed for sensitivity testing from the control panel are not acceptable due to the expense involved with manual testing as required by NFPA 72E.*

03. *The detector shall be suitable for two wire operation and two way communications on the intelligent analog signalling circuit.*

a. *The detector shall display a steady LED when in the alarm state when the system is operating from normal or standby power.*

04. *Detectors shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.*

a. *Address and sensitivity assignments shall be programmed electronically*

*and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.*

*(01) . The detectors shall be assigned a sensitivity level based on environment, time of day or any programmable function as required by the system user, and shall respond at that level whether in the "on line" or "default" mode*

*b. Detectors shall be supplied with enviroLINK feature enabling the detector to maintain a constant programmed sensitivity within the environment installed, regardless of contaminant accumulation. This feature shall compensate by increasing or decreasing the alarm threshold, dependent on the ambient detector chamber voltage, eliminating both failure to detect at the desired level and unwanted alarms at lower levels.*

*c. Detectors shall incorporate internal automatic temperature compensation to overcome the effects of either high or low ambient temperatures in the installed environment on the detector sensitivity.*

*d. The detector shall be tested every 24 hours by raising the detector sensitivity level to the alarm threshold, to check the operation of the detector without system alarming.*

*05. The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL (UROX) and shall be installed according to the requirements of NFPA 72E for open area coverage.*

*06. Detectors furnished shall be available in the following separate configurations to serve all possible environmental requirements:*

*a. Listed for installation in high air velocities and inside air ducts, between 300 and 1200 FPM, type ID-60IA.*

*b. Listed for installation in air duct sampling housings for the detection of smoke in HVAC system ducts, type ID60-IB.*

2.08. *Smoke Detectors, Intelligent Photoelectric*

*A. Furnish and install where indicated, Cerberus Pyrotronics type ID-60P, intelligent photoelectric smoke detectors with features and characteristics as follows:*

*01. The detector shall be self compensating for ambient temperature and humidity.*

*02. The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discreet electrical value for status tracking and logging for determining maintenance and cleaning requirements.*

*a. The control panel shall provide a sensitivity readout from the detector*

*without removal from the pluggable base.*

*b. Detectors not specifically listed for sensitivity testing from the control panel are not acceptable due to the expense involved with manual testing as required by NFPA 72E.*

*03. The detector shall be suitable for two wire operation and two way communications on the intelligent analog signalling circuit.*

*a. The detector shall display a steady LED when in the alarm state when the system is operating from normal or standby power.*

*04. Detectors shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.*

*a. Address and sensitivity assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable. The detectors shall be assigned a sensitivity level based on environment, time of day or any programmable function as required by the system user, and shall respond at that level whether in the "on line" or "default" mode.*

*b. Detectors shall be supplied with the enviroLINK feature enabling the detector to maintain a constant programmed sensitivity within the environment installed, regardless of contaminant accumulation.*

*This feature shall compensate by increasing or decreasing the alarm threshold, dependent on the ambient detector chamber voltage, eliminating both failure to detect at the desired level and unwanted alarms at lower levels.*

*c. Detectors shall incorporate internal automatic temperature compensation to overcome the effects of either high or low ambient temperatures in the installed environment on the detector sensitivity.*

*05. The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL (UROX) and shall be installed according to the requirements of NFPA 72E for open area coverage.*

*a. Detectors shall be listed for in duct use in air velocities between 0 and 4000 FPM in addition to open area coverage.*

*06. Detectors shall be furnished and installed with integral, self restoring 135 degree heat detectors where shown on the drawings, type ID-60P.*

*2.09. Heat Detectors, Intelligent Rate Compensated*

A. *Furnish and install where indicated, Cerberus Pyrotronics type ID-60T-135 heat detectors with features and characteristics as follows:*

01. *Detectors shall be of the intelligent, rate compensated type rated at 135 degrees. Detectors shall be constructed to compensate for the thermal inertia inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit.*

02. *The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester.*

03. *The detector shall be suitable for two wire operation and two way communications on the intelligent analog signalling circuit.*

a. *The detector shall display a steady LED when in the alarm state when the system is operating from normal or standby power.*

04. *Detectors shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.*

a. *Address assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.*

05. *The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet for use in environments as covered by Factory Mutual and UL (UQGS) and shall be installed according to the requirements of NFPA 72E for open area coverage.*

2.10 *Conventional Detectors used with the CZM-4 Conventional Zone Module or the CZM-1 Remote Zone Module*

01. *Ionization detector shall contain two ionization chambers and a solid state indicator lamp. The detector shall provide provision for field adjustment and measurement of sensitivity using an appropriate test instrument, and change the detector's sensitivity as required without removing the detector from its mounting base. The detector shall be a Pyrotronics Model DI-3.*

02. *Photoelectric detector shall contain a long life supervised LED emitting diode as its light source, a photo diode as its receiver and a solid state indicator lamp. The detector shall provide provisions for field measurement of its sensitivity. It shall be possible to electrically check the detector's sensitivity using an appropriate test instrument. The detector shall be a Pyrotronics Model PEC-3.*

03. *Thermal detector shall be either Fixed Temperature/ Rate of Rise, or a Rate Compensated detector as indicated on the drawings.*
*The detector shall be a Pyrotronics DT series detector.*

2.10. *Fire Detector Bases, Universal*

A. *Detector bases shall be Cerberus Pyrotronics type DB-3S, low profile twist lock type with screw clamp terminals and self wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box.*

01. *Where selective localized control of electrical devices is required for system operation, furnish and install type DBI-60R detector base with software programmed addressable relay integral to the base. The relay shall switch electrical loads, as indicated on the drawings.*

02. *Where indicated, furnish type ADBI-60A, detector base with integral approved audible evacuation alarm signal having an output of 85db. The audible signal shall be software programmed for operation.*

03. *Furnish a concealed security lock, preventing unauthorized removal, installed in the base in those areas requiring tamper resistant installation as indicated.*

04. *The detector bases shall be compatible with, and allow the installation of, detectors operating on the flame, ionization, photoelectric or rate compensated heat principles of detection.*

2.11. *Manual Stations, Intelligent*

A. *Provide Cerberus Pyrotronics type (MSI-10, single action) (MSI-20, double action) intelligent manual stations where indicated to be flush or surface mounted as required.*

01. *Station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring.*

02. *The manual stations shall be addressable and identifiable by the master fire alarm control panel.*

a. *Address assignments shall be set electronically and reside within the station in non volatile memory. Devices using rotary switches, pins, jumpers or staples are not acceptable.*

03. *Surface mounted stations where indicated on the drawings shall be mounted using a manufacturer's prescribed matching baked red enamel outlet box.*

04. *Fire Alarm stations shall be metal per NYC/FDNY. Stations connected to a central station shall carry a diagonal white strip across the face which shall not obscure operating instaructions.*

2.12. *Remote Conventional Zone Module*

A. *Provide, for integration of compatible 2 wire and shorting style contact devices into the analog signalling circuit, Cerberus Pyrotronics type CZM-1 intelligent analog signalling circuit interface module with the following capabilities:*

01. *Communication interaction with the analog signalling circuit having the capability of reporting alarm or trouble conditions from the devices monitored.*

02. *Compatibility with ionization and photoelectric and linear beam style smoke detectors, heat detectors and all listed contact type devices.*

a. *The system manufacturer shall have specifically listed heat, smoke,*

*ionization, linear beam detectors for use with the remote conventional zone module.*

*03. Module shall be equipped with terminal strip and pressure style screw terminals for the connection of the device and systems communications field wiring. The module shall also have an on board alarm Led furnished with the cover plate.*

*04. The module shall be addressable and identifiable by the master fire alarm control panel.*

*a. Address assignments shall be set electronically and reside within the module in non volatile memory. Devices using rotary switches, pins, jumpers or staples are not acceptable.*

*05. Modules shall be installed where indicated on the drawings using industry standard 4" square electrical outlet boxes; flush, surface, weatherproof as required for the area indicated.*

*2.13. Intelligent System Interface Module*

*A. Furnish and install, for the monitoring of contact type initiation devices and for the control of electrical devices where required, Cerberus Pyrotronics Type TRI-60 intelligent analog signalling circuit interface module. Modules shall be supplied to meet the project requirements as follows:*

*01. A single circuit intelligent signalling circuit interface module for monitoring alarm, trouble, supervisory or status contact type devices, type TRI-60.*

*02. Unit as above with form C software programmable control contacts for the management of specified electrical loads as required by this specification, type TRI-60R.*

*03. Dual circuit units as described in paragraph A.01 above, type TRI-60D.*

*B. The module shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester.*

*C. The module shall be suitable for two wire, two way communications on the intelligent analog signalling circuit.*

*01. The module shall display a steady LED for each circuit, in the normal power or standby power condition, when in the alarm state or during control circuit activation.*

*D. Modules shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.*

01. *Address assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.*

2.14. *Intelligent Supervised Control Module*

A. *Furnish and install for the control of supervised relays, contractors, audible signal circuits, visual signal circuits, distributed speaker circuits and two way fire fighters communication circuits, Cerberus Pyrotronics type ICP, intelligent supervisory and control modules including features as follows:*

01. *The modules shall be suitable for two wire operation and communications on intelligent analog alarm detection loops as manufactured by the Cerberus Pyrotronics Co.*

a. *Address assignments shall be accomplished electronically. Devices requiring dip switches, rotary switches, staples and/or jumpers are not acceptable.*

02. *The module shall display a steady LED in the normal power or standby power condition, when in the activated state.*

03. *The module shall be suitable for semi-flush or surface mounting in a 2" deep, 4" square or double gang electrical outlet box having a depth of 3 1/2".*

B. *Modules shall be available to supervise reverse polarity supervised indicating circuits utilizing 24VDC, two way supervised fireman's communication circuits or audio circuits utilizing 25VRMS or 70.7VRMS. It shall be possible to configure the module for supervised control of motor contractors and AC voltages to 115VAC.*

01. *All connected field wiring shall be supervised for opens, short circuits and grounded circuits.*

02. *All controlled circuits shall be power limited at 1.5A, produced by self restoring thermal components. Units requiring circuit replacement for restoration of outputs are not acceptable.*

a. *Signal outputs shall be supported in either Style"Y" or Style"Z" configuration.*

b. *The module shall report a trouble condition in the event of loss of the 24VDC signal operating supply voltage.*

c. *Visual signals shall be mounted at a height of 80 inches above the highest level of the finish floor or six inches below the ceiling, whichever is lower.*

2.15. *Evacuation Signals, Voice Reproducing*

A. *Furnish and install where shown on the drawings, audible visual signals, Cerberus Pyrotronics type SPKM7070W with the following characteristics and capacities:*

01. *Field selectable power taps at 3db increments between .25 And 2 watts and driven at 70.7vrms.*

02. *Sound output rating of 90db at full power tap.*

03. *Pressure type screw terminals with capacity to use up to 12AWG wire for speaker connection.*

04. *Visual alarm signals shall be furnished with minimum light intensity of 117 candela complying with the ADA act and the following requirements:*

a. *Xenon strobe with a minimum repetition rate of 1 HZ, not exceeding 3 HZ and a maximum duty cycle of 40% with a pulse duration of .2 seconds.*

b. *Unfiltered or clear filtered white light.*

c. *Visual signals shall be mounted at a height of 80 inches above the highest level of the finish floor or six inches below the ceiling, whichever is lower.*

B. *The evacuation signals shall be available in flush, semi-flush, or surface versions as required for signal locations shown on the contract documents. Signals shall be mounted using a listed outlet box, and as required, tile bridges.*

01. *Signals shall be available in audible only, visual only and combination to satisfy all required project applications.*

2.19. *Color Graphic Alarm Display Terminal*

A. *System capacities and capabilities*

01. *The color graphics display system shall consist of a MSDOS based computer system, complete with keyboard, hard disk drive, printer and color monitor. The system shall be capable of being expanded up to the maximum capacity of the system. The system shall be field programmable via the system keyboard and/or the mouse supplied with the system.*

02. *In an alarm or trouble condition the following shall occur;*

a. *Sound an audible at the color graphics display location.*

b. *Write the details of the actuation to a system log file on the color graphics system hard disk drive.*

c. *Print the details of the actuation to the system printer.*

d. *Activate the color graphic display system controls. The system shall have the following minimums:*

(01) *"Zoom In" and "Zoom Out"; providing a minimum of ten levels of zoom.*

(02) *"Next Alarm", provide access to the next active device in alarm.*

(03) *"Show Troubles", provide access to devices in trouble should alarms be active.*

(04) *"Show Alarms", provides access to devices when viewing troubles. Alarms shall be prioritized over supervisory, trouble, and any new alarm shall be automatically displayed.*

(05) *"Previous, provides access to the previous event of any type in the queue.*

(06) *"Show Supervisory", provides access to devices in a supervisory condition, should alarms be active.*

03. *The system shall have utility files that shall have the ability to use existing CAD drawing files to produce graphics required for this facility. Systems that require a specific CAD package shall not be considered equal.*

04. *The system shall automatically display a device custom action message of 70 characters minimum for each actuating device connected to the fire alarm control panel.*

05. *The system shall have the capacity to sequence up to 190 simultaneous alarms, 190 troubles, 190 supervisories.*

06. *System configuration shall be menu driven and capable of being operated by a person with no previous computer programming experience.*

B. *Equipment*

01. *Furnish an IBM compatible PC with a 80486 processor with at a minimum processing speed of 50 MHZ. The power supply shall be rated at a minimum of 180 watts continuous load. The computer shall have at least one 3.5 high density floppy diskette drive and be equipped with at least 16 megabytes of 80 nanosecond dynamic random access memory.*

02. *The computer shall have two serial RS232 input/output ports configured as COM1 for communications with the FACP and COM2 for interface to optional touch screen. Communications to the fire alarm control panel shall be via an interface module. This module, supplied by the fire alarm control panel manufacturer, shall contain the circuitry to interface the computer RS232 format configured as COM 1 with conversion to 20 MA*

*current loop or other long distance transmission for communication to the fire alarm control panel.*

03. *The hard disk drive shall be sized to suit the installation; an average of four screens per alarm point, with 25% spare space, and with a minimum of 30 megabytes. The hard disk controller shall be 1:1 interleave and provide a minimum of 450 kilobytes per second data throughput when operating with the hard disk drive.*

04. *The monitor shall be high resolution with a resolution of 640 vertical and 350 horizontal lines and a dot pitch of .28 mm as a minimum. Screen size shall be a minimum od 14" diagonal measurement, unless detailed otherwise on the drawings. Optional screen size of 19" shall be available.*

06. *A logging printer shall be installed adjacent to the graphics terminal as shown on drawings. This printer shall be an "IBM/EPSON" compatible with a parallel data connection to the graphics computer parallel port designated as LPT1. Carriage width shall be a minimum of 15" allowing for 132 characters per line. Printer head shall be a minimum of 9 pin dot matrix. At least two (2) fonts and an option for compressed print shall be available via a selector panel on the printer.*

A. *Software:*

01. *The software shall control the operations, functions and display of the graphics system and provide for automatic boot up and run from the hard disk drive of the computer.*

02. *All project specific actuating device programming shall be capable of being carried out on site via password access.*

03. *In the normal mode the monitor shall display a series of promotional screens that automatically change at approximately 10 seconds intervals to the next screen in the queue. The minimum screens in the queue shall be eight (8) with the number displayed selectable via password access. This password shall be separate from the programming password.*

04. *The graphics system shall monitor all alarm, supervisory, trouble and conditions detected by the fire alarm control panel and provide separate disk based log files, for each condition. These logs may be enabled, disabled, or cleared with password access. These log files are to be continually appended until manually cleared so as to provide complete historical information of all alarms and troubles.*

*This log information is not to be lost upon power failure or fire alarm control panel reset. A utility file shall be provided to sort the log data by date or by device and display this*

*information either on the screen or the system printer.*

05. *The system shall be capable of automatically displaying a device specific custom message of 70 characters for each actuating device connected to the fire alarm control panel. Up to 190 current alarms and 190 current troubles, 190 current supervisory events shall be able to be displayed.*

06. *When an alarm or trouble is registered at the fire alarm control panel the graphics system shall display the first screen image for the first actuated device. The system shall be capable of zooming in for further information up ten (10) times if required. At all times when in the alarm or trouble mode the fire control panel status i.e. number of current alarms and or troubles is to be displayed on the graphics screen.*

07. *A terminate and stay resident (TSR) utility program shall be part of the system software and be capable of operating with proprietary third party CAD, scanning and drawing programs. This TSR program shall be capable of capturing screen images for use as displays by the fire alarm graphics system program. Once captured these screen images are to be capable of being reproduced by the graphics software without the use of the CAD, scanning or drawing programs that produced them. A screen file viewing utility program shall also be provided to allow display of the captured screens for checking purposes.*

08. *The main menu shall consist of the following as a minimum requirement;*

    a. *Monitor (Return to normal mode)*

    b. *Devices (Provide access to device configuration sub-menu)*

    c. *Logging (Provide access to disk log sub-menu)*

    d. *User Options (Provide access to operating options)*

    e. *Utilities (Provide access to consistency reports, icon editor, custom messages, data base )*

    f. *Quit to operating system (Exit graphic system and return to computer disk operating system)*

09. *The Color Graphics System shall be Cerberus Pyrotronics and consist of the software as detailed above, and interface card, and an operation manual.*